

REMARKS/ARGUMENTS

Claims 1, 6, 7, 12 and 26-28 are pending. Support for the amendments made to claims 1 and 26 can be found in prior claims 2-5 and 8. Support for the use of metal oxide can be found at page 10, lines 7-12. Support for the term integrated contiguous network of polymers spanning the particles can be found at page 3, lines 17-18. Support for the language that the solid particles are in physical contact with each other can be found at page 3, lines 3-4. New claims 27 and 28 find support in the originally filed claims.

Claims 1-6 and 8 are rejected under 35 USC 103(a) as being obvious over Good or Fuller in view of Frechet.

Each of Good and Fuller disclose chromatographic columns containing cross-linked polymeric material bonded to discrete particulate packing material either directly or *via* a coupling agent. The packing material ranges in size from 40 mesh to 120 mesh. In Fuller, the cross-link polymeric material (the partitioning agent) is set forth at column 4, lines 35-61. Each of the disclosed polymers are aromatic and therefore hydrophobic in nature. They are designed for reverse phase chromatography as evidenced by the chromatograms set forth in FIG. 7 and FIG. 8. In Good, the partitioning agent is a polymeric material as set forth at column 4, line 74, through column 5, line 51. As with Fuller, the disclosed polymers are aromatic and therefore hydrophobic in nature and are useful in reverse phase chromatography. See, e.g., the chromatograph set forth in FIGS. 7 and 8.

Applicant is unaware of any disclosure in Good or Fuller relating to a partitioning agent which would provide a chemically reactive group useful in further modification of the surface of the partitioning agent *in situ*.

Frechet discloses a continuous liquid chromatographic column containing a separation medium in the form of a macroporous polymer plug. The porous plugs are made by

polymerization of polyvinyl monomers on a mixture of polymeric monomers and monovinyl monomers in the presence of an initiator and a porogen. After polymerization, the organic polymer plug is washed with a suitable liquid to remove the porogen. The pore sizes range from 200 nanometers to 3 microns. The various polyvinyl monomers and monovinyl monomers which may be used are set forth at page 5, lines 25-46. Most of these monomers are other than aromatic. Col. 7, lines 35-64, indicates that functional groups may be added to the macroporous polymer. However, the addition of functional groups requires a chemically reactive group that is already a part of the polymer plug, e.g., glycidyl methacrylate.

In order to render a claim obvious, all of the elements of the claim must be present in the cited art. In addition, there must be a motivation to combine the references as well as a reasonable expectation of success.

Claims 1 and 26 presently claim a matrix comprising metal oxide particles in physical contact with each other and an interstitial space comprising a cross-linked interstitial polymer network covalently attached to the particles to form an integrated contiguous network which spans the particles. In the case of Claim 1, the interstitial polymer network further comprises a functional group comprising a member of a binding pair whereas in Claim 26 the functional group comprises a reactive moiety. In each case, the functional group is covalently linked to the interstitial polymer network.

As previously discussed, Good and Fuller disclose a partitioning agent immobilized on suitable packing materials such as diatomaceous earth, firebrick, silica and the like. See, e.g., Fuller, column 9, lines 42-43. This specific disclosure is clearly directed to the direct formation of a hydrophobic stationary phase for reverse phase chromatography. There is no suggestion in either Fuller or Good to modify the stationary phase in any way after it is formed nor is there a provision for such modification within the disclosed polymers used to form the stationary phase.

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Frechet on the other hand discloses a macroporous polymer plug which contains reactive chemical moieties when it is desired to further modify the interior surface of the porous polymer. Such circumstances include the provision of ionic groups for ion exchange chromatography, hydrophobic groups for reverse phase chromatography and affinants for affinity chromatography.

The disclosures of Good and Fuller in combination with Frechet do not render the claims obvious. Frechet discloses the formation of a macroporous plug while Good and Fuller disclose the application of a partitioning agent to a packing material. By analogy, Frechet discloses donut channels which can be further functionalized whereas Good and Fuller disclose donut holes (as in the bakery sense) which are essentially chemically non-reactive. As such, these references disclose solid supports which physically and chemically differ from each other. While Frechet may disclose further reaction of the surface of its donut channels, such disclosure cannot be combined with the donut holes of Good and Fuller, as these later references do not teach the formation of a partitioning layer which can be further chemically modified to add functional groups. Thus, one skilled in the art would not be motivated to combine the references to reach the presently claimed invention. Moreover, the combination would not result in the requisite reasonable expectation of success. The chemistry disclosed in Frechet to add functional groups is not designed to react with the partitioning agents disclosed in Good and Fuller.

The other rejections are considered moot since the referenced claims are all dependent upon independent claims 1 or 26 which for the foregoing reasons are patentable over the primary reference cited by the Examiner.

Considering the foregoing, it is submitted that the claims are patentable over the art of record and that a notice of allowance should issue.

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The Assistant Commissioner is hereby authorized to charge any required fees, including extension fees, or credit any overpayment to Deposit Account No. 50-2319 (Our Order No. A-69071/RFT/469190-5).

Respectfully submitted,

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